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# SCIENCE

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## DINNER IN HONOR OF DR. KEEN

ON January 20, 1921, a dinner was tendered to Dr. William Williams Keen, the eminent Philadelphia surgeon, at the Bellevue Stratford Hotel, in Philadelphia, in celebration of his eighty-fourth birthday. Dr. Keen had recently returned from Europe, whither he had gone in the summer of 1920, to preside at the meeting in Paris, of the Société Internationale de Chirurgie, of which he had been elected president in 1914, and the meetings of which had been of necessity suspended during the war. Everywhere abroad he had been received with honors befitting his position as President of this Society, and as the leader and dean of American surgery. It was thought an appropriate time for the friends and admirers of Dr. Keen in this country, to show their appreciation of his many achievements as physician, scientist, educator, man of letters, and patriotic American. The occasion proved to be one of the most remarkable tributes ever tendered a private citizen in Philadelphia. Between five and six hundred subscribers, representing all parts of the country, and all of the learned professions, and the fields of diplomacy, industry, finance, and the public services, joined in honoring Dr. Keen.

The presiding officer and toastmaster was his close friend and colleague, Dr. George E. deSchweinitz, professor of ophthalmology in the University of Pennsylvania, and like Dr. Keen, a former president of the College of Physicians of Philadelphia, the premier medical society of the United States. The speakers, who dwelt on various phases of the activities of Dr. Keen's long and busy life, had all been closely associated with him in one or more of these fields of work. The list included the following gentlemen: Dr. J. Chalmers DaCosta, his one-time assistant, now Gross professor of surgery, in the Jeffer-

son Medical College, in which chair he had succeeded Dr. Keen on the retirement of the latter from active teaching. Dr. William H. P. Faunce, president of Brown University, of which institution Dr. Keen is an alumnus, and of which he has been for many years a most active trustee. Dr. William H. Welch, professor of pathology in Johns Hopkins University, and like Keen a strong exponent and defender of the field of experimental investigation in medicine. The Hon. David Jayne Hill, former ambassador to Germany, who spoke of the interest and efforts of Dr. Keen in the large problems of civic and national welfare, and of his sturdy Americanism. The many letters of congratulation to the guest of the evening had been collected and bound in three volumes, and these were presented by Major General M. W. Ireland, surgeon general of the United States Army, who detailed Dr. Keen's connection with the Medical Department of the Army, beginning with his services in the field and in the hospitals during the Civil War, and down to, and including the World War, when he held a commission as a reserve officer, with the rank of major. A bronze bust, by Samuel Murray, of Dr. Keen in his uniform as an officer of the Medical Corps, U. S. Army, was presented to him on behalf of the subscribers to the dinner, by Dr. William J. Taylor, president of the College of Physicians, and for many years his private assistant.

Dr. Keen responded in happy vein, reviewing the many world changes transpiring during his long life, with special reference to the revolutionary advances in the sciences, and particularly in medicine and surgery, in many of which he had indeed played a leading part. His address is printed below. A reception to Dr. Keen followed the dinner.

JOHN H. JOPSON

PHILADELPHIA, PA.

#### ADDRESS OF DR. KEEN

As I have listened to what I might call "oral photographs" of myself, I assure you that it has been with genuine humility, as I

realized how far short I had come of these fine ideals. I lay no claim to superlative virtues. I am only a loyal American, who, to the best of his ability, has tried to do his daily duty to his fellowmen, his dear country and his God. You have looked on my homely merits with more than kindly eyes, and have regarded my faults and my failings with more than friendly forgetfulness. I thank you again and again from the bottom of my heart.

This bust, the product of Mr. Murray's skill, I accept for myself and my descendants with special pleasure from you, Dr. Taylor, so long my able assistant, later my colleague and always my dear friend. It is the visible evidence of that precious, imponderable, yet all powerful force—the affection of many friends.

What shall I say through you, General Ireland, my distinguished pupil, to the writers of these many letters in three stately volumes. They are generous libations poured out on the altar of Friendship. "Timeo Danaos et dona ferentes" was a valid warning in ancient Troy, but *my* gift-bearing Greeks I welcome with fearless and profound gratitude.

It may be a happy augury that we meet to-day rather than yesterday, the actual anniversary of my birth. By a little stretching of the imagination to-day, I can describe myself as "well along"—a phrase with a truthful indefiniteness—"well along on the way to my 85th birthday," and what is imagination for if not to stand by us when we need help?

To-morrow, in spite of the terrible temptation you have held out to me to do otherwise, I promise you that I shall wear the same Stetson hat as heretofore. I hardly can call it the companion of my youth, but I do treasure it as an old acquaintance which still fits well.

My manner of life from my youth up has been known to you among whom I have lived for four score years and four. It is a source of sincere gratification to me that, in spite of all my faults and shortcomings, of which I am fully conscious, on the whole you seem to approve of it.

When one has reached the altitude of 84, it is natural that he should turn and scan the

far distant horizon and note the outstanding features of his long journey. A brief mention of a few of the more striking events which have occurred during my long life may, therefore, prove of some interest.

My ancestor, Jöran Kyn (George Keen), following the Mayflower pilgrims only 23 years later, left Sweden in the retinue of John Printz, the first Governor of New Sweden, and reached the Delaware River in 1643. He founded the nearby city of Chester. We, his descendants, I think may fairly claim to be truly Americans.

During my lifetime, the United States has (observe *not have* but *has*) grown from a small and isolated nation of only sixteen millions in 1837 to a nation rapidly approaching one hundred and sixteen millions. We have also spread from the Alleghanies to the Pacific. Instead of being isolated, we are bound to all the world by a splendid devotion to Liberty and Law. What a free Democracy can do, even across 3,000 miles of boisterous water, to aid in crushing a tyranny which threatened to engulf the whole world, is the most splendid episode in our entire national history.

Yet how short our life as a nation is may be better appreciated when compared with the life of a single citizen. From the date of my birth, January 19, 1837, back to July 4, 1776, is only 61 years and a half. From that same date to yesterday is 84 years!

One man links me to the first Napoleon, for, in 1862, I assisted the elder Gross in an operation on a Frenchman for a wound received in the Russian campaign of 1812. One woman, my maternal grandmother Budd, links me even with Washington himself. She often related to me how he used to caress her as a young girl, when seeking food and forage from my great-grandfather's farm just across the ridge from Valley Forge in that fearful winter of 1777.

The first six-weeks of my life were spent during the reign of that sturdy old patriot, Andrew Jackson. He and I had at least one thing in common—we were profoundly ignorant of each other's existence. In another

matter, our attitudes were miles apart. He was obsessed as to the removal of the deposits of the United States Treasury from that stately building at 4th and Chestnut Streets, while I well recall how utterly indifferent I felt about that exciting subject. But I made the air vibrant if my daily ration was too long delayed.

Long since, I gave up the rather opprobrious phrase "Old Age" and have substituted for it the more seductive locution "accumulated years." The latter connotes a certain joy in continued acquisition, a sort of pride in adding one annual sparkling jewel after another to an already precious store.

I was asked recently how it was that I had managed to accumulate so many years, to which I promptly replied, "Nothing is simpler—don't stop. Just keep right along." Mix merry laughter with earnest labor. Always have some as yet unfinished, but not too urgent job waiting just outside your door. Then you will never know ennui. To "kill time" is murder in the first degree.

William Dean Howells, one of the privileged few who spell their names in the plural because they are such multiplied personalities, in his delightful essay on "Eighty Years and After," first pays his respects to several nonagenarians. He then turns upon those of us who have accumulated ten fewer years (he actually being also one of us) and says, "As to the Octogenarians, there is no end of them; they swarm, they get in one's way."

I humbly crave pardon of any of you if I occupy a place in the sun to which you have a better right than I. Ultimately, no doubt, I shall get out of your way, but do not overlook the fact of my maliciously good health, and that a collateral forbear reached the mature age of 106. The prospect, therefore, of speedy relief, I regret to say, seems rather discouraging. I commend to you the philosophy of life of the woman who, when asked by her minister what passage of Scripture gave her the greatest comfort, promptly replied, "'Grin and bear it' helps me most."

The development of industry, of commerce and of the material things which minister to

man's comfort and health, during my lifetime have been marvellous.

The shrill whistle of the locomotive had been barely heard before 1837, but few there were who foresaw what a revolution in transportation and in industry steam was to produce. Steamships, depending wholly on steam, first ventured across the Atlantic when I was a year old.

The early staccato of the telegraph had also made itself heard, but its future growth and possibilities on land, and under the sea, and in the air could not have been even imagined.

The typewriter, the telephone and the automobile have tripled the efficiency of the doctor. Possibly the airplane in time may quadruple it.

May I venture here to digress for a moment to let you enjoy the recent experience of one of my London scientific friends. In writing a letter he dictated to his secretary, an ardent suffragette, the phrase, "When Plancus was Consul," alluding to the friend of Horace to whom he addresses the seventh in the first book of his Odes. What was his amazement to read in the letter presented for his signature, "When Pankhurst was Consul." He was so appreciative of the joy that this variant reading would give his friend, that he signed the letter unchanged.

Science has progressed by leaps and bounds. "The most fruitful periods of Science," says Duclaux, in his recent *Life of Pasteur*, "are those in which dogmas are shaken," that is to say when every postulate is ruthlessly re-examined. This "shaking of dogmas" has given us radio-activity, and has divided the "atom"—that supposed ultimate particle of matter, whose very name means "indivisible"—in some cases into hundreds of electrons.

By the Spectroscope which, in my university days at Brown, existed only in embryo as the curious "Fraunhofer lines" of the solar spectrum, we now analyze the chemical elements of suns many millions of times larger than our own and so distant that the light now reaching our eyes from them started on its earthward journey hundreds of thousands

of years ago. Even light itself has been measured and weighed, and Einstein's formulation of the doctrine of relativity is proclaimed as the most fundamental discovery since the days of Sir Isaac Newton.

In 1876, scarcely 45 years ago, electricity had progressed but little beyond the point where Franklin had left it at the time of his death in 1790, just eighty-six years before the Centennial Exposition. Now, the slogan, "If it is not electric, it is not modern" is almost literally true.

At the Centennial Exposition, modern electricity was represented by Professor Farmer's *one arc light* on the roof of the main building, the "avant courier" of a mighty host. The dynamo—appropriately named. Might, Force, Power—had been slowly developing in the brains of Faraday and his successors. Within the last two score years, that giant has been harnessed and has become our obedient slave in heat, light and power, on land and on sea, in mine and in mill. In fact, the catalogue of the things that the dynamo *can not* as yet do would be shorter than the things it *is* actually doing—and the end is not even yet in sight.

My professional life covers sixty-one years of study, active practise, writing and teaching. At its very outset occurred the most fortunate event in my professional life—I fell under the spell of Dr. S. Weir Mitchell. I have met many eminent medical men at home and abroad, but I do not hesitate to say that he was by far the most alert, original and stimulating mind with which I have ever been in contact. I have often called him a "yeasty man" for he leavened and set in fermentation every mind which touched his own. He gave me my first scientific impulse and set congenial tasks for my mind and pen. For over 53 years we worked together in many activities of the profession, with never a cloud between us.

Close upon making his acquaintance came the Civil War. By a curious accident<sup>1</sup> I became an assistant surgeon in the Army on

<sup>1</sup> Keen's "Addresses and Other Papers," p. 421.

July 1, 1861, before I was a graduate in medicine. I knew but little medicine but I replaced a predecessor who demonstrably knew still less, for, at the end of my first year, I coached him for graduation at the end of his second year. I am in doubt whether I ought to be commended or condemned for the result, for he actually succeeded in achieving his diploma.

As to myself, my very ignorance was a safeguard to those under my care for I was inidposed to take any serious risk by heroic treatment. After this service with a regiment of "three months' men," we were honorably discharged August 1, 1861. I then completed my studies and obtained my M.D. in March, 1862. After a real examination, I reentered the service, fortunately for me not in the regulars to which I was entitled, but as an Acting Assistant Surgeon.

Again Mitchell's inspiring touch was vouchsafed to me. At his request, I was assigned, by Surgeon General Hammond, to the neurological ward under Mitchell and Morehouse. I became the junior in what might be called a neurological "firm." "Mitchell, Morehouse & Keen" became very widely known to the profession because Mitchell made it so. His generosity to me when my diploma was hardly dry, in associating my name with his own, already widely known as that of a distinguished physiologist, was as fortunate for me as it was generous upon his part. Our studies, especially in the Turner's Lane Hospital, Philadelphia, laid the foundations of modern Neurological Surgery.

Returning from study in Europe in 1866, I took over the Philadelphia School of Anatomy—founded by Lawrence in 1820—and taught anatomy and operative surgery to large private classes of medical students (1866–1875) when the government took the property for the use of the present postoffice.

From 1866 to 1875, I taught surgical pathology in the Jefferson Medical College. In doing this, I learned ten times as much as my most studious pupil. From 1876 to 1890, I lectured on artistic anatomy in the Pennsylvania Academy of the Fine Arts.

From 1884 to 1889, I was professor of surgery at the Women's Medical College, and from 1889 to 1907, I was professor of surgery in the Jefferson Medical College, a total service as a teacher of 41 years (1866–1907). No one, not himself a teacher, can imagine the joy of that long service. To meet daily scores of earnest, alert minds, greedy for knowledge, was a daily inspiration and developed the most intense desire to give of one's very best.

In 1901–02, with two of my daughters, I made a tour around the world. We penetrated into Java and beyond the Caspian into Turkestan, almost to the western border of China. It is no wonder that, having taught many thousands of students, I was heartily welcomed by some of them in country after country. From the Golden Gate, all the way to Russia, traveling over westward, in Hawaii, Japan, China, the Philippines, India, Egypt, Greece and Palestine, in every land save Java and Turkestan, I had old students. In Korea, also, several were and still are doing splendid service as medical missionaries and others again as teachers in the Medical College in Siam. Even in Persia, there was one—a Persian who returned to his native land as a Christian Medical Missionary. Early in the World War, when the Turks captured Urumiah, where he was dispensing health and happiness to his fellow countrymen, they seized him and gave him the fearful choice—Mohammedanism or the stake—and Joseph Shimon, the martyr, was burned alive for his faith, by the unspeakable Turk!

The nine epoch-making medical events in the last century and a quarter are:

1. Vaccination against smallpox (1796).
2. Anesthesia (1846).
3. Pasteur's researches were the foundation of the new science of bacteriology (1850 to 1884).
4. Pasteur's chief claim to fame is his further and "fundamental discoveries in immunology, or the science of the specific *prevention* of disease" (Flexner).
5. Pasteur's and Lister's researches resulting in antiseptic and aseptic surgery and obstetrics.

6. The discovery that insects carry disease (1889).
7. The discovery of radio-activity and especially for medical use, the X-rays (1895).
8. The development of a medical literature written by American authors (1859-1920).
9. The founding of great laboratories of research.

With the exception of the first, *every one of these wonderful discoveries has occurred during my own lifetime.*

The first research laboratory was founded in 1884 by Andrew Carnegie, in connection with the Bellevue Hospital Medical College in New York. Others, larger and more elaborate, soon followed, usually in connection with other medical schools. The greatest and most useful of them all is the wonderful Rockefeller Institute for Medical Research, an independent institution in New York City. From that busy center has come one beneficent discovery after another, the last being the discovery by that remarkable genius, Hideyo Noguchi, of the germ of yellow fever, and the preparation of a vaccine which in case of exposure, has proved to be not only a means of protecting those who have never had an attack, but to be actually curative of the fever if administered very early.

In my student days, practically all of our important medical text books were of European, and especially of British origin. The sole exception was the elder Gross's two-volume *Surgery* (1859) and, twenty years later, Agnew's *Surgery* in three volumes. Now, there is hardly any department of medicine in which there are not several American text-books of great merit, and our medical journals rival those of Europe.

The first text-book of *Surgery* in the English language, founded upon bacteriology, the corner stone of modern surgery, was the "*American Text-book of Surgery*," which I organized, and later, with the assistance of Dr. J. William White, as co-editor, and eleven other American surgeons—published in 1892. It passed through four large editions. I have just finished a still larger work by about 100

American and British authors in eight volumes, averaging 1,000 pages each. It took 18 years of labor ere I could write "*Finis*" as 1921 was ushered in.

Every intelligent person knows of the actual revolution in surgery, medicine, obstetrics and all the specialties, which has taken place of late years. Anesthesia has robbed surgical operations of nearly all their pain. Antiseptic, and later, aseptic methods, have made the old operations safe, as shown by an unparalleled diminution of the mortality. It has made possible, also, a vast number of operations which were absolutely prohibited in the first twenty years of my professional life, because of their fatality. "*Noli me tangere*" was writ large on the head, the chest and the abdomen. To-day, we invade these earlier sacrosanct cavities with a free hand and with glorious life-saving results.

Medicine has progressed equally far. We know the causes of various diseases, which we were fighting in the dark until bacteriology revealed to us the realm of the almost infinitely little, but they put the multiplication table to shame by the incredible rapidity of their growth. It is Lilliput versus Gulliver.

Medical science, however, girded up its loins in our laboratories of research and at the bedside, and resolutely attacked the enemy, and has won victory after victory. We learned soon not only the cause but the mode of transmission of these various diseases, especially the remarkable discovery that insects—the mosquito, the louse, the tick, the flea and the fly—and some of the lower animals, especially the dog and the rat, were the means of spreading disease.

The results of these combined discoveries are seen in the imminent banishment from the whole earth of yellow fever, the immense diminution of typhoid, tetanus, diphtheria and other germ diseases, and the curbing of tuberculosis and other diseases, barring, of course, the results of the war.

Maternity, which nature surely intended to be a normal and a safe physiological event, was very dangerous for years after I graduated. The usual death rate in the '60's and

'70's was from three to five mothers in every hundred, and sometimes childbed fever raged in epidemic form and killed at the rate of 20, 40 and even 55 mothers in every hundred!

Now, this most beautiful of all human relations has been made safe—mark my words—*made safe* by the researches, especially of Pasteur and his successors. *Bacteriology has won this splendid victory.* Within the last decade, series of 6,000, 7,000 and even over 8,000 cases have been reported *without the death of a single mother from infection.* Is not that a cause for a *Te Deum*?

But I must call a halt though I have not told even a small fraction of the fascinating story, of what, remember, I have been an enthusiastic living witness.

And what of the future? Have we any reason to expect other astonishing and beneficent discoveries? I answer with an unqualified affirmative. And it may well be still greater and still more beneficent discoveries.

With this word of cheer, I face the coming year or, if it so please God, the coming years, with a confidence which is enhanced by your wonderful tribute of affection.

#### THE RELATION OF MENDELISM AND THE MUTATION THEORY TO NATURAL SELECTION<sup>1</sup>

Two marked tendencies are evident in the history of any important theory after its publication.

First. The followers of the discoverer carry the theory too far and attempt too universal an application. This is manifestly true of Wallace and Weismann who out-Darwined Darwin in their claims for natural selection; of the followers of Mendel, such as Morgan and Pearl; and of many mutationists who make much greater claims for that theory than does De Vries himself.

Second. Each generation of biologists is so occupied with its own work and contemporary theories that it makes no real effort to understand preceding theories.

<sup>1</sup> Read before the American Society of Naturalists at Chicago, December 31, 1920.

This second tendency seems to me most marked in the attitude of present workers along genetic lines towards natural selection. They reveal an apparent lack of understanding of what Darwin really meant and of what he claimed; and when criticising that theory they are often engaged in the classic, but unprofitable, exercise of "fighting windmills,"

In view of these facts I hope you will pardon me if I present in as few words as possible just what I believe to be the main factors which Darwin presented as resulting, in their actions and reactions, in natural selection. These factors are three in number:

First. *Heredity*, by which the progeny tend to resemble their parents more than they do other individuals of the same species.

Second. *Individual variation*, by which the progeny tend to depart from the parental type and sometimes from the specific type.

Third. *Geometrical ratio of increase*, by which each species tends to reproduce more individuals than can survive.

Each of these factors is practically axiomatic, so little is it open to argument.

No one doubts the *fact* of heredity, whether pangenesis, Weismannism or Mendelism be the correct expression of the mechanism involved. These do not affect the *fact* of heredity nor invalidate it as a factor in natural selection.

No one doubts the *fact* of variation; whether it is the "individual variation" of Darwin, the "fluctuating variety" or the "mutation" of De Vries. All that is necessary for Darwin's purpose is that there be heritable variations. That there are such things all parties agree and it matters little what you call them. They are adequate to act as a factor in the Darwinian scheme.

No one doubts the *fact* of geometrical ratio of increase. It is a proposition easily capable of mathematical demonstration, and that it is sufficient for Darwin's purpose.

These three factors, then, are not debatable as facts, whatever their mechanism or causes.

A moment's reflection will show that geometrical ratio of increase is a *quantitative* factor, giving an abundance of individuals

from which to select; that individual variation is a *qualitative* factor, giving the differences which make a selection possible; and that heredity is a *conservative* factor, holding fast those characters which better fit the organism to its environment.

Now it seems to me that there is no possible outcome of the necessary action and interactions of these three factors that would not be a *selection* of some sort. Darwin thought it comparable in a large way to the selection by which the stock-breeder improves his herd, and therefore called it "natural selection," carefully guarding the phrase from misinterpretation from the teleological angle as well as from a too close parallelism between artificial and natural selection. And I believe no one has suggested a more acceptable term for the process of selection resulting from the interplay of natural laws.

Three outstanding theories have been advanced since the publication of the "Origin," each involving an advance in our knowledge of the mechanism of heredity on the one hand and of the origin of variations on the other.

Weismann's theory of the continuity and stability of the germplasm was of immense importance in its discussion of the mechanism of heredity, and his amphimixis gave a plausible explanation of the origin of variations. His results were almost universally regarded as confirming and greatly extending the scope of natural selection.

Mendel's theory regarding the purity of the gametes, their segregation in the sex cells, and the whole complex Mendelian mechanism so admirably described by Morgan; all of these, fascinating and important as they are, deal with the *mechanism* rather than the *fact* of heredity. In my opinion their acceptance or rejection does not affect the status of natural selection as a theory of organic evolution.

But it is the theory of mutation that has furnished most of the ammunition for the opponents of natural selection; and this in spite of the fact that De Vries, the originator of the mutation theory, expresses himself with great clarity as follows:

My work claims to be in full accord with the principles laid down by Darwin and to give a thorough and sharp analysis to some of the ideas of variability, inheritance, selection and mutation which were necessarily vague in his time.

In 1904, when these words were published, there did seem to be a sharp distinction between the ideas of Darwin and those of De Vries. The former believed that natural selection acted upon many small variations and accumulated them until the differences were sufficient to constitute new species; while De Vries claimed that new species were formed by the sudden appearance by mutations of forms specifically distinct from the parents. That mutants *were* new species!

It seems evident that Darwin did not regard "saltatory evolution" as the common method, while De Vries did.

Darwin believed that individual, usually small, variations furnished the material on which selection acts; while De Vries thought that mutants, usually large variations, furnished the material. Both, however, believed thoroughly that natural selection was a *vera causa* of evolution.

But things have changed greatly since 1904. The work of Morgan, Castle, Jennings and a host of others has shown that many mutations are so small, from a phenotypic standpoint, that they are quantitatively no greater than the individual variations of Darwin; and that they are heritable in the mendelian way.

Castle produced a perfectly graded series of hooded rats which exhibits almost ideally the steps by which a new form might be produced by natural selection. He says:

If artificial selection can, in the brief span of a man's lifetime, mould a character steadily in a particular direction, why may not natural selection in unlimited time also cause progressive evolution in directions useful to the organism?

Jennings says:

Sufficiently thorough study shows that minute heritable variations—so minute as to represent practically continuous gradations—occur in many organisms: some reproducing from a single parent others by biparental reproduction. . . . It is *not* established that heritable changes must be sudden

large steps; while these may occur, minute heritable changes are more frequent. . . . Evolution according to the typical Darwinian scheme, through the occurrence of many small variations and their guidance by natural selection, is perfectly consistent with what experimental and paleontological studies show us; to me it appears more consistent with the data than does any other theory.

Many believers in mutation have been needlessly befuddled by the diverse meanings of "variations" as used by Darwin and De Vries. Darwin included in his "individual variations" both the "fluctuating varieties" and the "mutations" of De Vries. Phenotypically they can not even now be distinguished. De Vries himself candidly admits that this was Darwin's attitude, thus proving himself more clear-sighted than many of his followers. All that Darwin needed for his purpose was proof of variations that are heritable, and these are found in mutations, be they large or small.

Just as mendelism has to do with the *mechanism* and not the *fact* of heredity, so the mutation theory deals with the *nature* and not the *fact* of variations. Neither, in my opinion, has any implication that is antagonistic to the theory of natural selection.

The statement has often been made that natural selection "originates nothing" because it does not explain the origin of variations. I must confess to scant patience with this point of view. As well say that the sculptor does not make the statue because he does not manufacture the marble or his chisel; or that the worker in mosaic originates nothing because he does not make the bits of stone which he assembles in his design!

The material corresponding to the bits of stone in the mosaic is furnished by heredity and variation, and its quantity by geometrical ratio of increase. Natural selection acts in selecting and putting together this material in the formation of new species. Thus, in a true sense, it seems evident that something new has appeared—something that is but *was not*.

Another favorite figure, introduced I be-

lieve by De Vries, is "Natural selection acts only as a sieve" determining which forms shall be retained and which shall be discarded. This also seems to me to fall short of a complete statement of the truth. If the material subjected to the sifting process be regarded as changing with each generation by the addition of variations, or mutations if you prefer, some of which are favorable to a nicer adjustment of the species to its environment; the figure would be more nearly correct. To make it complete, however, the *mesh* of the sieve must change from generation to generation so that a quantitative variation which would be preserved in one generation would be discarded in a later one. But in this case natural selection would do more than a sieve could do. It would combine a number of favorable variations in the production of something new, a *new species*!

In conclusion it seems to me that we are justified in maintaining that Mendelism and the mutation theory, while forming the basis of the most brilliant and important advances in biological knowledge of the last half century, have neither weakened nor supplanted the Darwinian conception of the "Origin of species by means of Natural Selection."

C. C. NUTTING

#### SCIENTIFIC EVENTS

##### PROFESSOR CALMETTE ON A VACCINE FOR TUBERCULOSIS

THE Paris correspondent of the *London Times* reports that the *Petit Journal* publishes an interview with Professor Calmette, sub-director of the Pasteur Institute, which indicates that progress has been reached in the long struggle of the medical profession to find a cure for the ravages of tuberculosis. Professor Calmette was careful to tell his interviewer not to proclaim too widely that a cure has been found. "We are only at the dawn," he said. "The possibilities are immense. I can assure you, but we have still much work before us . . . in following the pathway which now lies open before us and which will lead us perhaps to a splendid realization of our hopes. Hope is now permissible."

Professor Calmette then gave an account of the results of his researches and those of Dr. Guérin, which proved that cattle and monkeys could be given immunity. A vaccine has been found for cattle. Experiments lasting over many months have given results said to be of importance.

Professor Calmette stated that in a certain stable they placed five known tuberculous cows. With them were housed ten heifers, four of which had not been given an effective vaccine, and the other six had been vaccinated. The trial lasted for thirty-four months, some of the cattle being revaccinated each year. At the end of the time, when the beasts were slaughtered, it was found that of the four unvaccinated heifers three showed advanced tuberculosis. Of the six vaccinated beasts the two which had only once been vaccinated showed distinct signs of the disease, but the four animals which had been vaccinated three times, although they had been in constant company with the tuberculous companions for thirty-four months, showed no trace of the disease. Further experiments on a large scale are now going on.

To find out whether this vaccine is capable of being applied to man experiments will be necessary on chimpanzees and anthropoid apes. These animals do not take kindly to temperate climates, and Professor Calmette and his collaborators have therefore decided to build an experimental laboratory in French Guinea. The Pasteur Institute has obtained the concession of Rooma Island, four miles from Konakry, for their researches, and the governor of Western Africa has put at the institute's disposal from the 1921 budget the sum of about £6,000, with which the laboratories will be constructed. The researches of the scientific missions will take some years, and the estimated expenditure is £5,000 a year.

#### AWARDS OF THE PARIS ACADEMY OF SCIENCES

ACCORDING to the report in *Nature* the prizes awarded by the Paris Academy include the following:

*Mathematics.*—Grand prize of the mathematical sciences to Ernest Esclangon, for his memoir entitled "New Researches on Quasi-periodic Functions"; the Poncelet prize to Elie Cartan, for the whole of his work; the Francœur prize to René Baire, for his work on the general theory of functions.

*Mechanics.*—A Montyon prize to Stéphane Drzewiecki, for his book on the general theory of the helix, with reference to marine and aerial propeller-blades; the de Parville prize to Jean Villey, for his work on internal-combustion motors.

*Astronomy.*—The Lalande prize to Léopold Schulhof, for his revision of the catalogue of the proper motions of 2,641 stars; the Valz prize to Ernest Maubant, for his work on the calculation of the perturbations of comets; the Janssen medal to William W. Coblentz, for his work on the infra-red radiation of terrestrial sources and of stars; the Pierre Guzman prize between François Gonnessiat (5,000 francs), for his work on the photography of the minor planets; René Jarry-Desloges (5,000 francs), for his physical observations on the planets, especially Mars, and Joanny-Ph. Lagrula (4,000 francs), for his work on the rapid identification of the minor planets.

*Geography.*—The Delalande-Guérineau prize to Georges Bruel, for his explorations and publications relating to French Equatorial Africa; the Tehihatchef prize to Auguste Chevalier, for his explorations in Africa and Indo-China; the Binoux prize to Marcel Augiéras, for his work in the western Sahara.

*Navigation.*—The prize of 6,000 francs between Fernand Gossot (4,000 francs), for his treatise on the effects of explosives, Pierre de Vanssay de Blavous (1,500 francs), for the whole of his work, and René Risser (500 francs), for his work on ballistics.

*Physics.*—The L. La Caze prize to Georges Sagnac, for the whole of his work in physics; the Hébert prize to Léon Bouthillon, for his work on wireless telegraphy; the Hughes prize to Frédéric Laporte, for his work on electrical standards and the photometry of electric lamps; the Clément Felix foundation to Amédée Guillet, for his researches on chronometry.

*Chemistry.*—The Montyon prize (unhealthy trades) to Léonce Barthe, for his work on the hygiene of workshops; the Jecker prize (5,000 francs) between Henri Gault, for his work in organic chemistry, and Henri Hérissé, for his researches on the glucosides of plants; the L. La

Caze prize to Robert de Forcrand, for his work in inorganic chemistry.

*Mineralogy and Geology.*—The Fontannes prize to Olivier Couffon, for his work entitled "Le Callovien du Chalet (Commune de Montreuil-Bellay)"; the Joseph Labbé prize to Albert Bordeaux, for his applications of geology to the solution of mining problems. The Victor Raulin prize is postponed until 1921.

*Botany.*—The Desmazieres prize to André Maublanc, for his work in mycology and plant diseases; honorable mention to Pierre Sée, for his book on the diseases of paper; the De Coincy prize to Lucien Hauman-Merek, for the whole of his botanical work. The Montagne prize is not awarded.

*Anatomy and Zoology.*—The Cuvier prize to Alphonse Malaquin, for the whole of his work in zoology; the Savigny prize to F. Le Cerf, for his "Revision des *Ægeriides algériens*"; the Jean Thore prize to A. Cros, for his biological studies of the Coleoptera of northern Africa.

#### THE UNIVERSITY OF LONDON'S PHYSIOLOGICAL LABORATORY

At its meeting in December the senate of the University of London decided that the physiological laboratory must be closed at the end of July next unless assurance of adequate support is received from the London County Council or other sources. *The British Medical Journal* writes:

The laboratory was established under the direction of Professor A. D. Waller, F.R.S., in 1902, at the headquarters of the university in the Imperial Institute, South Kensington, the equipment being provided out of a fund of £4,000 provided from private sources. It has since been maintained partly out of university funds and partly by private assistance, with the help, during the last nine years, of an annual grant of £500 from the London County Council. This grant is now to be withdrawn, and the university has no funds out of which to make up the deficit. In deciding to close the laboratory, the senate appears to be influenced also by the need of finding additional room in its present quarters for general university purposes; this is indicated by a further resolution stating "that should adequate support for the transference and maintenance of the physiological laboratory be forthcoming, the laboratory be continued during the pleasure of the senate elsewhere than in its present quarters, which shall be vacated not later than the end of July, 1921." Physiologists will

agree with Sir E. Sharpey Schafer that the closure of the laboratory would be a serious misfortune. "It is," he says, in a letter to the *Times*, "unique from the fact that, being unattached to any particular medical school or college, it has been untrammelled by the necessity of providing elementary teaching in physiology, and has been able to devote all its energies to research. The success it has obtained in this under the able guidance of the director, Professor A. D. Waller, is universally acknowledged. The originality of Professor Waller's methods and the brilliant results which have been obtained from their application—especially in the difficult subject of electrophysiology—are well known. It would be a real calamity if a sudden stop were put to these activities." It is suggested that the reason why the London County Council has withdrawn its contribution at this time is the expectation that it will shortly have to contribute a large sum toward the cost of building new university headquarters. "It would seem," Sir E. Sharpey Schafer concludes, "a pity to allow an active laboratory to be abolished in order to save £500 a year towards the cost of problematical buildings." "Problematical," perhaps, is not quite the right word, because, we presume, something will have to be done for the university, but no building can be undertaken for some considerable time to come. We can only express the hope that, should the London County Council remain obdurate, public-spirited benefactors, recognizing the importance of the university having at least one research laboratory, will come to the rescue. We may, at any rate, express the expectation that means will be found to carry on the laboratory until the question of the new site for the university is settled.

#### POPULAR LECTURES ON SCIENTIFIC SUBJECTS AT THE CALIFORNIA ACADEMY OF SCIENCES

WITH the opening to the public of the new Museum of the California Academy of Sciences in Golden Gate Park, San Francisco, in 1916, one of the activities of the educational policy put into effect by Dr. Barton Warren Evermann, the director of the museum, was courses of popular lectures on scientific subjects of general interest. These courses began in the fall of 1916 and have been continued each year since, without interruption except during the summer months. The lectures are given at three o'clock each

Sunday afternoon in the museum auditorium. Among the lecturers have been many of the most distinguished men of science on the Pacific coast and a number from the east. The courses for the present year are proving of unusual interest. Those given in the first part of the year have already been mentioned in *SCIENCE*. Those for the first months of 1921 have been announced by Director Evermann as follows:

Three lectures by Professor Lewis, of the University of California, as follows:

January 2. "Atoms and ions." Illustrated.

January 9. "Electrons and positive rays." Illustrated.

January 16. "Radioactive transformations." Illustrated.

Three by Professor D. L. Webster, of Stanford University, will be as follows:

January 23. "General properties of X- and Gamma-Rays." Illustrated.

February 6. "X-Ray spectra." Illustrated.

February 13. "The structure of atoms." Illustrated.

On January 30 Dr. E. C. Slipher, Lowell Observatory, Flagstaff, Arizona, lectured on: "Photography of the planets, with special reference to Mars." Illustrated.

Upon the completion of this course on physical subjects other lectures will be given as follows:

February 20. Mr. Edward Berwick, Pacific Grove, Calif., subject: "How Uncle Sam's money is wasted."

February 27. Dr. Harlow Shapley, Mount Wilson Solar Observatory, Pasadena, subject: "The dimensions of the stellar universe." Illustrated.

March 6. Major W. B. Herms, associate professor of parasitology, University of California, subject: "Eighteen thousand miles in search of mosquitoes in California—how and why?" Illustrated.

March 13. Mr. Harry S. Smith, entomologist, State Department of Agriculture, Sacramento, subject: "Parasitism among insects."

March 20. Dr. E. C. Van Dyke, assistant professor of entomology, University of California, subject: "Some injurious forest insects of California."

March 27. Mr. Frederick Maskew, formerly chief deputy quarantine officer, State Department

of Agriculture, subject: "Insect quarantine work of the State Department of Agriculture."

April 3. Dr. R. S. Holway, associate professor of physical geography, University of California, subject: "The evolution of California scenery." Illustrated.

April 10. Dr. B. L. Clark, assistant professor of paleontology, University of California, subject: "Ancient seas and their faunas." Illustrated.

April 17. Dr. G. D. Louderback, professor of geology, University of California, subject: "Chief events of earth history in the California region." Illustrated.

April 24. Dr. Chester Stock, research assistant, department of paleontology, University of California, subject: "The former mammalian life of California." Illustrated.

Upon the completion of the above there will be five lectures in May on the general subject of meteorology. This course is being arranged by Mr. E. A. Beals in charge of the United States Weather Bureau Office, San Francisco. The subjects and speakers will be announced later.

#### SCIENTIFIC NOTES AND NEWS

DR. THEODORE LYMAN, professor of physics and director of the Jefferson Physical Laboratory, Harvard University, has been elected president of the American Physical Society.

THE Edison medal, awarded annually for work in electrical engineering by the American Institute of Electrical Engineers, will be presented this year to Dr. M. I. Pupin, professor of electromechanics at Columbia University.

DR. IRA REMSEN, president emeritus of the Johns Hopkins University, professor of chemistry emeritus at the institution, has accepted an offer from the Standard Oil Company to act as consulting chemist for the corporation.

DR. PEARCE BAILEY has been awarded a distinguished service medal in recognition of his services as chief of the division of neuro-psychiatry of the Surgeon-General's Office.

KING GEORGE has signified his intention of conferring the honor of knighthood on Dr. Maurice Craig, consulting neurologist to the Ministry of Pensions, and Dr. P. Horton-

Smith Hartley, senior physician at the Hospital for Consumption and Diseases of the Chest, Brompton.

THE pupils and friends of Professor E. Morselli recently celebrated the fortieth anniversary of his incumbency of the chair of psychiatry at the University of Genoa. The celebration occurred during the Italian Congress of Neurologists and Alienists, held at Genoa in his honor. A copy of Raphael's Madonna of the Candelabra, in a sixteenth century frame, was presented to him by public subscription.

THE Geological Society, London, has made the following awards: Wollaston medal, Dr. John Horne and Dr. B. N. Peach; Murchison medal, Mr. E. S. Cobbold; Lyell medal, Dr. E. de Margerie, director of the Geological Survey of Alsace-Lorraine; Bigsby medal, Dr. L. L. Fermor, Geological Survey of India; Wollaston fund, Dr. T. O. Bosworth; Murchison fund, Dr. Albert Gilligan; and Lyell fund, Professor H. L. Hawkins, Reading University College, and Mr. C. E. N. Bromehead, H.M. Geological Survey.

THE Paris Academy of Medicine has elected the following officers for the year 1921: *President*, Dr. Richelot; *Vice-president* (president for 1922), Professor Bourquelot, and *Annual Secretary*, Professor Achard.

HERBERT E. GREGORY, professor of geology at Yale University and director of the Bishop Museum in Honolulu, has returned to the Hawaiian Islands.

DR. OSKAR KLOTZ, professor of pathology and bacteriology at the University of Pittsburgh, will sail on February 9 for São Paulo, Brazil, to assume for a two-year period the directorship of the pathological laboratories at the University of São Paulo, under the auspices of the Rockefeller Foundation.

PROFESSOR CHARLES J. TILDEN has been granted a leave of absence from Yale University, where he was called to reorganize the engineering courses a year ago, to become director of the Highway Education Committee appointed by the federal commissioner of education.

DR. L. A. MIKESKA has accepted a position on the staff of the Rockefeller Institute, New York City, having left the Color Laboratory of the Bureau of Chemistry in Washington, D. C., where he was working on photosensitizing dyes.

DEAN A. PACK, Ph.D. (Chicago), has been appointed plant breeder in the Office of Sugar-Plant Investigations, Bureau of Plant Industry, U. S. Department of Agriculture. Dr. Pack has charge of the sugar beet seed breeding work for the department in the Intermountain States, with headquarters at Salt Lake City, Utah.

DR. J. C. WITT, assistant professor of analytical chemistry in the University of Pittsburgh, has resigned to become chief research chemist for the Portland Cement Association with headquarters in Chicago. Dr. Witt has been succeeded in his former position by Dr. C. J. Engelder, of Hornell, N. Y.

MR. THOMAS M. RECTOR, formerly in charge of the division of food technology of the Institute of Industrial Research, Washington, D. C., has been appointed director of the department of industrial chemistry of the Pease Laboratories, Inc., New York City.

DR. EDGAR FAHS SMITH, formerly provost of the University of Pennsylvania, made an address on February 11, on "Research," before the New York Section of the American Electrochemical Society in joint session with the American Chemical Society, the American Section Society of Chemical Industry and the American Section of Société de Chimie Industrielle.

DR. J. S. PLASKEET, director of the Dominion Astrophysical Observatory, Victoria, B. C., delivered two addresses at the University of Washington on January 19 and 20, the one on "Modern ideas of the universe," and the other on "The chemistry of the stars." These lectures were held under the auspices of the University of Washington Chapter of Sigma Xi, the Puget Sound Section of the American Chemical Society and the Puget Sound Section of the American Institute of Electrical Engineers.

WE learn from *Nature* that Dr. E. W. Scripture has lately returned from Germany, where he has been lecturing on experimental phonetics applied to the study of English. Dr. Scripture, who was formerly assistant professor of experimental psychology in Yale University, and associate in psychiatry in Columbia University, is now resident in London, where he has been for some years engaged on studying records of speech in epilepsy, general paralysis and other nervous diseases.

At the annual general meeting and conversazione of the Harveian Society of London, held on January 13, Dr. Turtle was elected president for the ensuing year. The retiring president, Dr. Hill, delivered an address on the advances in the methods of treatment of disease of the œsophagus during the present century.

Six Hunterian lectures on the "Principles of human craniology," illustrated by specimens and preparations, were delivered by Professor Arthur Keith at the Royal College of Surgeons, during January.

THE Osler Society for the Study of Medical History has been organized by a group of twelve physicians of the Mayo Foundation. Dr. William C. MacCarty, associate professor of pathology, has been elected president of the society.

A COMMITTEE has been appointed to undertake a campaign for the collection of a fund of \$500,000 for the endowment of two memorials to the work of the late Dr. Henry Baird Favill, of Chicago. It is proposed to create a Henry Baird Favill Memorial Laboratory, with fellowship endowments, in St. Luke's Hospital, to the interests of which Dr. Favill devoted many years of special effort. For this purpose a fund of \$250,000 is solicited. A like sum is desired for the establishment of the Henry Baird Favill Foundation, the income of which shall be used for the promotion of public instruction in health and hygiene. Mr. Edgar A. Bancroft is chairman, and Mr. N. D. Sibley is secretary of the committee.

A BRONZE tablet was recently unveiled in the medical laboratory of the University of Rio

de Janeiro to commemorate the work there of Professor Diogenes Sampaio, who died in 1918. He was influential in the organization of the laboratory which is henceforth to bear his name.

DR. HUGH A. MCCALLUM, dean of the Western University Medical School of London, Canada, died on January 25.

SIR LAZARUS FLETCHER, keeper of minerals in the British Natural History Museum from 1880 to 1909 and then director of the museum until 1919, died on January 6, in the sixty-seventh year of his age.

DR. ODOARDO BECCARI, director of the Botanical Garden at Florence, known for his explorations in New Guinea from 1860 to 1870, and as an authority on the classification of palms, died at Florence on October 25.

THE death is announced of Dr. Wilhelm Foerster, professor of astronomy at the University of Berlin, at one time director of the Royal Observatory. Dr. Foerster was born at Grunberg, Schleswig, December 16, 1832.

PROFESSOR C. GEORGE SCHILLINGS died in Berlin, on January 29, aged sixty-five years. He was known for his travels in East Equatorial Africa and his studies of African zoology.

THE United States Civil Service Commission announces an open competitive examination for psychologist in the Public Health Service throughout the United States at a salary of \$2,200 a year, or with quarters and subsistence \$1,600. Applicants must have graduated from a college or university of recognized standing and have had at least three months of experience in normal psychology. They should apply, before March 15, to the Civil Service Commission, Washington, D. C.

THE annual meeting of the American Medical Association is to be held in Boston, June 6-10, under the presidency of Dr. Hubert Work, Pueblo, Colo.

THE American Psychological Association will hold its thirtieth annual meeting at Princeton on December 28, 29 and 30, 1921.

THE spring meeting of The American Society of Mechanical Engineers will be held in Chicago at the Congress Hotel, from May 23 to 26. Sessions are planned by the professional sections on aeronautics, fuels, management, material handling, machine shop, power, forest products and railroads.

THE *Journal* of the American Medical Association states that investigations made by the Rockefeller Foundation indicate that the countries of central Europe, with the possible exception of Austria, suffer from a shortage of physicians. Thus, in Poland less than 2,000 physicians are said to be available to care for the 25,000,000 inhabitants, and in Serbia it is stated there are less than 300 physicians outside of the army medical officers. In its efforts to rehabilitate the medical schools of central Europe, the Rockefeller Foundation has decided to aid in the establishment of a high grade medical school at Belgrade.

A SPECIAL committee from the Petrograd Academy of Science has proposed a plan to the academy, whereby a closer contact between the scientific men of Russia and Western Europe may be forwarded.

ON December 31 the Zoological Society at Hamburg decided to close the Zoological Gardens because the city can not afford to aid in maintenance.

MRS. EUGENE SILLIMAN BRISTOL has given \$1,000 to the proposed Silliman fund, the income of which will be applied to the maintenance of the *American Journal of Science*.

#### UNIVERSITY AND EDUCATIONAL NEWS

DR. WALLACE W. ATWOOD, lately professor of physiography at Harvard University, was inaugurated as president of Clark University, on February 1.

DR. W. B. CANNON, professor of physiology, and Dr. Otto Folin, professor of biological chemistry, at Harvard University, were last autumn, offered research positions in the Mayo Clinic at Rochester, with all possible facilities

for the conduct of research work and with salaries approximately twice those given by the university. They have, however, decided to remain at Harvard.

PROFESSOR F. C. NEWCOMBE, of the department of botany of Michigan University, has been granted leave for the second semester of the current year. His mail address will be Palo Alto, Calif. During Professor Newcombe's absence Professor H. H. Bartlett will be administrative head of the department.

DR. EARNEST ALBERT HOOTON has been appointed assistant professor of anthropology at the Harvard Medical School, and Dr. William Lorenzo Moss, assistant professor of preventive medicine and hygiene.

DR. G. W. A. LUCKEY, formerly dean of the school of education of the University of Nebraska, has been appointed specialist in foreign education in the U. S. Bureau of Education, Washington.

#### DISCUSSION AND CORRESPONDENCE

##### THRICE TOLD TALES

TO THE EDITOR OF SCIENCE: Referring to the letter of Professor Wood,<sup>1</sup> I, also, have a story about the Lick Observatory and to enable Professor Wood to have a whack at it I hasten to offer it to the public. In the summer of 1891 I was the guest of the then director of the observatory, Professor E. S. Holden, for a week or ten days while making a series of gravity measurements and I was greatly interested in the "public nights," in the establishment and maintenance of which the institution has done a most admirable piece of work.

On one of these occasions I was watching the long line of visitors formed near the big refractor, each awaiting his turn for a look through that wonderful instrument. The object to which it was directed at that time was a star cluster and, as every one knows, when a cluster is viewed through a telescope the number of stars seen is increased enormously and those visible to the naked eye are greatly en-

<sup>1</sup> SCIENCE, January 14, 1921.

hanced in brightness and although a glorious sight there is no showing of round disks like the sun, moon or the near planets when examined in the same way.

In some way my attention was drawn to a man somewhat back from the head of the line who seemed to be in a condition of tense excitement over the experience in store for him. He may have traveled hundreds of miles (as they do in California) for the opportunity of viewing the heavenly bodies with the aid of the enormous glass and, impatient with those ahead of him who lingered somewhat at the eye-end of the telescope, he seemed to fear lest the world should come to an end before his turn came. Having observed (I have no doubt a very common experience) that the first look through a large telescope or a microscope of very high power is generally a disappointment, I quietly "attached myself" to this man and was at his side when at last his chance came. He had been told the nature of the object and eagerly putting his eye to the eye piece he stood perfectly motionless for one long minute. Then, after glancing around to see if any of the members of the "staff" were near by, and assuming, doubtless, that I belonged to the "line," he held his open hand by his mouth to prevent the spread of his voice and hissed into my ear the words "*damned fraud.*"

I have told this story several times in the last quarter of a century, having thought it a rather good one and before Professor Wood despoils me of it by "running across it" in the *Novum Organum*, the *Principia*, the Dowager Duchess Cristina's account of her visit to Galileo's Observatory or some other old place, I hope he will remember that constructive criticism is the only thing that goes these days and that a good story should never be "scrapped" except for the purpose of making a better one.

T. C. MENDENHALL

P. S. This letter might be indorsed, "Attention Mr. David Wilbur Horn," another iconoclast who on the same page shows a disposition to rob us of the charming picture of the young Galileo standing amidst his Aristotelian enemies at the foot of the tower of Pisa

(though Professor Cajori has him at the top I insist that he must have been at the bottom in order to witness the effect of his experiment upon his opponents) calmly and confidently awaiting the arrival of the two balls simultaneously released at the top.

Have we not believed that imagination was a *sine qua non* in the equipment of a man of science? Even the swinging lamp in the Duomo has been robbed of its romance by the discovery that it was not in existence in Galileo's day. We may cling to the rope by which it is suspended, however, for, as far as I know, no one has yet proved that it is *not* the actual thing whose vibrations the young philosopher found to be isochronous.

And before it is too late I hope some enterprising company will "film Archimedes springing from his bath and running into the street, naked as a pair of his own compasses."

T C. M

TO THE EDITOR OF SCIENCE: Apropos of thrice told tales, as illustrated by the communication of Mr. Wood in SCIENCE January 14, 1921, I may point out that the familiar story of Lincoln, in his young days, nailing a lie in court by showing the witness lied when he said he saw the deed done in the moonlight, because the moon was not at that date in the sky at night, is found practically the same, when ascribed to different occasions by (1) Plutarch in the life of Alcibiades as to the desecration of the statues of Hermes. (2) Chambers' "Book of Days," Lippincott ed., Vol. I., p. 14, in another court scene. (3) "Lincoln, the Lawyer," by Frederick Trevor Hill, p. 230 seq.

The human mind runs easily and copiously in well-worn channels and one may easily construct plausible hypotheses, without introducing that of plagiarism. I have recently seen the story of the lesson taught by the stars ascribed, I think, to still a fourth source, which I now forget. There are so few really good stories we might well allow them to travel as far and as long as they continue to instruct and amuse, without going too deeply into the question of the absolute varacity of

those who pass them along. A good story should never be spoiled by that.

JONATHAN WRIGHT

PLEASANTVILLE, NEW YORK,

January 18, 1921

#### REPLY TO PROFESSOR HORN

MANY times has the undersigned been found to be in error on historical questions. It is not easy to write during a period of over thirty years without occasionally committing mistakes. Even Newton once said, "It's impossible to print the book without faults." However, it is due to myself to state that not all the errors attributed to me are errors in reality. In not a few cases the critics themselves are in error. But never, before the appearance of Professor D. W. Horn's letter (SCIENCE, January 14, 1921), have I been accused of "Romancing in Science." Had Professor Horn been less excited and more contemplative, he would have written differently. My account of Galileo was prepared a quarter of a century ago. Were I to re-write it, I would make some slight changes. "Prior to Galileo it did not occur to any one actually to try the experiment" relating to acceleration. More recent research reveals that Galileo, like most great scientific men, had his forerunners. I say that Galileo publicly experimented "one morning." This may have been the correct time of day, but I am not now able to verify the statement. Galileo "allowed a one pound shot and a one hundred pound shot to fall together." From Galileo's "Dialogues Concerning two New Sciences" it appears that he did perform this experiment, but I am not sure that these were the particular weights used when experimenting before the university assembly. I have gone over sentence by sentence the passage quoted by Professor Horn and the above are the only changes which seem to me perhaps necessary. I repel as unjust the charge that I am "romancing in science."

Dr. Partridge rendered a service in calling attention to Galileo's experiments at the Tower of Pisa. However, I still think that the Doctor overstated his case, was wrong in

implying that Galileo made only one experiment, and without sufficient reason called in question the accuracy of Viviani's "Life of Galileo"—a life which Favaro, after very many years devoted to the study of Galileo, has found to be remarkably reliable. Of course, part of the discussion hinges on the word "exactly." No description of an experiment can be exact in every detail. However, if essentials suffice, then our knowledge of Galileo's experiments on falling bodies is exact, for we know exactly the purpose of the experiments, as well as the mode of experimentation, namely, the dropping of different weights of a variety of materials—mention being made of some of the materials dropped.

Professor Horn quotes: *Fortis imaginatio generat causum*. I agree, but whose *casus* is it really?

FLORIAN CAJORI

UNIVERSITY OF CALIFORNIA

#### A CORRECTION

TO THE EDITOR OF SCIENCE: The times are actually worse than I realized when writing recently about "Romancing in Science." The opening quotation should have read "O tempora," instead of "O tempus." The peculiar appropriateness of this quotation is apparent, for the correction came to me (from New York) as part of an *anonymous* letter!

DAVID WILBUR HORN

BRYN MAWR, PENNSYLVANIA

#### MEMOIR OF G. K. GILBERT

THE undersigned is engaged in the preparation of a memoir of the late G. K. Gilbert, to be published by the National Academy of Sciences, and would be obliged if geologists and others who possess letters from him or who recall incidents that throw light upon his character would submit them for incorporation in the story of his life. His great contributions to geological science are published and fully accessible; but the smaller non-scientific matters which give the life of a man its finer savor can be learned only by personal communication from his friends. A good number of such communications have been already received; they are of so great

interest that many more are desired. As an example the following may be instanced: A well-known scientist in whose home Gilbert was a frequent guest, warmly welcomed by father, mother, and children, writes that one of his boys, when a little fellow, became so fond of the visitor that he for a year or so wound up his evening prayer with an added petition of his own invention—"O Lord! bless father, and mother, and Mr. Gilbert, and some ladies." It is often written of an eminent man that he was fond of children, but it is rare to find testimony as spontaneous and convincing as this to show that children were fond of him.

W. M. DAVIS

CAMBRIDGE, MASS.,  
January 27, 1921

### QUOTATIONS

#### THE PRINTING OF ASTRONOMICAL OBSERVATIONS

PRINTING has become so expensive that it will be necessary to revise some of our existing practises, and especially that with regard to original observations. There is an undoubted convenience in printing original observations just as they are made, for, however carefully they are discussed at the time, the general advance of astronomy may later provide an improved basis for discussion. Thus, old observations of position, such as those of Bradley or Groombridge, gained much from the growth in knowledge of instrumental errors, and old observations of variable stars have been rediscussed with advantage now that better magnitudes of comparison stars are available.

There is no reason to anticipate finality in improvement, and it is therefore a convenience to have the original material widely accessible; but one may have to pay too dearly for this convenience, and it looks as though the recent advance in prices had brought this contingency about. We have to be satisfied to store a fair copy of the original observations in some accessible place, such as the library of the Royal Astronomical Society or of a well-known observatory. Perhaps it would

be better to store two copies, one of which might be freely lent on demand, but not the other. There is, moreover, this to be said in favor of this more economical policy—it is not *always* the case that these original observations improve in value with time. No doubt they improve just at first, but something may happen which compensates the advantage of lapse of time; even Bradley's observations are to-day of historical rather than scientific interest, in comparison with modern observations, as Boss maintained stoutly years ago and others reluctantly admitted later. Micrometer measures of clusters by such careful observers as Pogson and Baxendell are to-day really not worth discussing; a couple of photographs at a few years' interval give better proper-motions—far better—than could be deduced by the use of these early micrometer measures. Hence the policy of holding up the printing of observations may in *some* cases obviate the need for printing at all; but if it is adopted, I would strongly urge the alternative of depositing a fair copy in some well-known library. And I may, perhaps, quote a particular instance to point the moral: recently I was interested in a particular variable of which maxima had been recorded by a particular observer nearly half a century ago; I got into communication with him, and found that he had given up observing and so far forgotten his own devoted work as to deny at first that he had ever made such observations! But he was good enough to ransack his papers, found the observations, and very kindly sent me a copy of them. They were of great value, and though perhaps it is going too far to say that they might have been lost, still it must be admitted that there was some risk of this disaster. Hence I should repeat the maxim deduced from my own experience and previously given in the form "when you have made five years' observations publish them" in a new dress:—"Either publish them, or deposit a fair copy in some well-known library, publishing an intimation to that effect."

As I have made reference to this increased cost of printing, may I call the attention of

other nations, who may not be similarly affected, to our altered circumstances? Before the war we welcomed papers from distant contributors almost unreservedly; our attitude towards such contributors personally is in no way changed, but our purses are not so full or are more rapidly emptied. We would ask them kindly to think twice before sending to us a paper which could just as well be printed in their own country; but I should add that this suggestion has no official character whatever, and is made on purely personal responsibility.—From an Oxford Note-Book in *The Observatory*.

### SPECIAL ARTICLES

#### ON THE STABILITY OF THE ACID-BASE EQUILIBRIUM OF THE BLOOD IN NORMAL AND IN NATURALLY NEPHROPATHIC ANIMALS<sup>1</sup>

IN a recent number of this journal<sup>2</sup> a note was published which had as its object a discussion of the influence of the age of an organism in maintaining its acid-base equilibrium. In this paper the observation was made that when animals of different ages were intoxicated by uranium nitrate, the factor of the age of the organism in the reaction was expressed by an inability of the senile animal to maintain with the same degree of perfection a normal acid-base equilibrium as was the case with the younger animal. More recently studies have been undertaken which have had as their object an investigation of the stability of the acid-base equilibrium of the blood in naturally nephropathic animals following the use of an anesthetic,<sup>3</sup> and of the ability of an alkali to protect the naturally nephropathic kidney against

the toxic effect of an anesthetic.<sup>4</sup> As a result of these studies the observation has been recorded that following the use of an anesthetic a greater disturbance in the acid-base equilibrium of the blood was induced in a naturally nephropathic animal than occurred in a normal animal. Furthermore, a more adequate degree of protection could be obtained in a normal dog against an anesthetic by the use of a solution of sodium bicarbonate than could be obtained in a naturally nephropathic dog.

The following study is concerned with an investigation of the stability of the acid-base equilibrium of the blood in naturally nephropathic animals as contrasted with normal control animals when this equilibrium is upset by the intravenous injection of an acid or an alkali.

Twenty-six dogs have been used in this series of experiments. Ten of the animals were normal and were employed as controls for the sixteen naturally nephropathic animals. The animals were anesthetized by ether. A glass canula was inserted into the femoral vein and connected with a buret. Through this connection the acid or the alkali was introduced into the animal's circulation. At the end of half an hour of etherization the reserve alkali of the blood (R.p.H.) was determined by the method of Marriott.<sup>5</sup> Blood for this purpose was obtained by puncturing the saphenous or external jugular veins. After making the initial determination of the animal's alkali reserve, both the normal control animals and the naturally nephropathic animals received intravenously either 5 c.c. per kilogram of a  $n/2$  solution of hydrochloric acid or 25 c.c. per kilogram of a three per cent. solution of sodium bicarbonate. Determinations of the alkali reserve of the blood were made in both groups of animals at fifteen minute intervals during the first hour

<sup>1</sup> Aided by a grant from the Rockefeller Institute for Medical Research.

<sup>2</sup> MacNider, William deB., "Concerning the Influence of the Age of an organism in maintaining its Acid-base Equilibrium," *SCIENCE*, N. S., Vol. XLIV., 643, 1917.

<sup>3</sup> MacNider, William deB., "I. A Study of the Acid-base Equilibrium of the Blood in Naturally Nephropathic Animals and of the Functional Capacity of the Kidney in Such Animals following an Anesthetic," *Jour. Exp. Med.*, Vol. XXVIII., 501, 1918.

<sup>4</sup> MacNider, William deB., "I. A Study of the Efficiency of an Alkali to Protect the Naturally Nephropathic Kidney against the Toxic Effect of an Anesthetic," *Jour. Exp. Med.*, Vol. XXVIII., 517, 1918.

<sup>5</sup> Marriott, W. McK., "A Method for the Determination of the Alkali Reserve of the Blood Plasma," *Arch. Int. Med.*, Vol. XVII., 840, 1916.

of the experiment and at half hour intervals during the final hour.

The normal alkali reserve of the blood for the control group of animals has varied from 8.0 to 8.1. When such animals are given intravenously 5 c.c. per kilogram of a  $n/2$  solution of hydrochloric acid there occurs within fifteen minutes a reduction in the alkali reserve of the blood which, in the normal animal of Experiment 4 that is representative of the group, was 7.85. In these animals there occurs at once an attempt to restore the normal acid-base equilibrium. Within the second fifteen-minute period of Experiment 4 the alkali reserve had increased from 7.85 to 7.95, and at the end of one hour the reading was 8.0. At the termination of the experiment the alkali reserve was 8.05, as opposed to the normal of 8.1.

The remaining five normal animals received intravenously 25 c.c. per kilogram of a three per cent. solution of sodium bicarbonate. The response of these animals to the introduction of such a solution has been of the same type. The animal of Experiment 7 had a normal alkali reserve of the blood of 8.1. At the end of fifteen minutes following the introduction of the solution of sodium bicarbonate the alkali reserve was increased to 8.3. Within half an hour, as a result of the attempt on the part of the animal to reestablish a normal acid-base equilibrium, the reading was 8.2. At the end of the first hour the normal reading of 8.1 had been established and remained at this point during the second hour of the experiment.

Sixteen naturally nephropathic dogs are included in the second group of animals. Eight of these animals received intravenously 5 c.c. per kilogram of a  $n/2$  solution of hydrochloric acid, while the remaining animals of the group received by the same method of administration 25 c.c. per kilogram of a three per cent. solution of sodium bicarbonate. Following a half-hour period of anesthesia by ether, the reserve alkali of the blood of these naturally nephropathic animals was found to vary between 8.0 to 8.1; a variation similar to that obtained for the normal control animals.

When a naturally nephropathic animal is given 5 c.c. per kilogram of a  $n/2$  solution of hydrochloric acid there occurs a rapid and marked reduction in the alkali reserve of the blood which is in excess of the reduction obtained in normal animals. In Experiment 14, which is representative of this group, there occurred within fifteen minutes after the introduction of the acid solution a depletion of the blood in its alkali reserve from the normal of 8.1 to 7.7. At the termination of the second fifteen minute period the reading remained unchanged, 7.7. No demonstrable attempt had been made on the part of the naturally nephropathic animal to reestablish a normal acid-base equilibrium. At the end of the first hour of the experiment the alkali reserve had increased to 7.85, and remained at this point during the final and second hour of the experiment.

The response of naturally nephropathic animals to a solution of hydrochloric acid differs quantitatively from the response of normal animals. The reduction in the alkali reserve of the blood is uniformly greater in a naturally nephropathic animal than it is in a normal animal. Furthermore, the normal animal is able to reestablish its acid-base equilibrium to a point within the range of the normal, while the naturally nephropathic animal is unable to effect such a return in the alkali reserve of the blood.

The eight naturally nephropathic animals that received intravenously a solution of sodium bicarbonate have shown the same type of reaction. The response of the animal of Experiment 21 is typical for this group. The animal had a normal alkali reserve of the blood of 8.0. Within the first fifteen minutes following the injection of the bicarbonate solution the reserve alkali of the blood rose to 8.4. At the end of the second fifteen minutes of the experiment the reading remained unchanged. At the end of the first hour the reserve alkali had been reduced to 8.2 and by the end of the second hour of the experiment to 8.15, a determination in excess of the normal reading of 8.0.

When the response of these naturally

nephropathic animals to a solution of sodium bicarbonate is compared with the response of the normal animals, the following differences are observed. The introduction of the solution into a naturally nephropathic animal effects a more marked disturbance of the acid-base equilibrium of the blood, as is shown by a greater increase in the alkali reserve, than occurs in a normal animal. When such a change is induced in the blood of a normal animal there occurs a rapid depletion of the reserve alkali of the blood with a return of the blood to its normal acid-base equilibrium. When, however, a similar type of change has been induced in the blood of a naturally nephropathic animal, the animal appears unable to effect with the same rapidity and degree of completeness a reduction in the reserve alkali of the blood with the reestablishment of a normal acid-base equilibrium. The reduction in the alkali reserve in such an animal takes place more gradually, and at the end of a two-hour period of observation the alkali reserve remains at a higher point than was obtained for the normal reading.

The experiments indicate that the reserve alkali of the blood in certain naturally nephropathic animals may be maintained by the animal within the range of normality. Such an observation is, however, no index of the ability of such an animal to maintain a normal acid-base equilibrium of the blood when the stability of the mechanism which regulates this equilibrium is subjected to the strain of handling either an acid or an alkali. When a normal animal receives intravenously an acid or an alkaline solution there occurs a disturbance in the acid-base equilibrium of the blood which is temporary, and which is rapidly followed by a reestablishment of the animal's normal acid-base equilibrium. When a naturally nephropathic animal is subjected to a similar disturbance in the acid-base equilibrium of its blood, the lack of stability on the part of the mechanism which maintains this equilibrium is shown by the facts that the acid or alkaline solution induces a greater degree of variation from the animal's normal equilibrium and that the animal is unable to

reestablish within the time limit allowed the normal animal a return of the blood to a normal acid-base equilibrium.

WM. DEB. MACNIDER

UNIVERSITY OF NORTH CAROLINA

## THE AMERICAN CHEMICAL SOCIETY

DIVISION OF PHYSICAL AND INORGANIC CHEMISTRY

Wm. D. Harkins, *chairman*

H. N. Holmes, *secretary*

*Preparation of zinc nitride:* W. J. BENTLY and PAUL L. STERN. After the trial of several methods of making zinc nitride the following was found to be the best. Ammonia was passed over zinc dust for 30 minutes at 650° C. and the product cooled to at least 200° C. before exposure to the air. The ammonia was treated to remove oxygen and moisture. The zinc dust was washed with a solution of ammonia and ammonium chloride, alcohol and ether. It was then dried in vacuo. The chief difficulty was in excluding oxygen from the system. The highest yield was 36.8 per cent. nitride. Alloys of zinc-zinc nitride were prepared up to 3.9 per cent. nitride. It is thought a thorough investigation will disclose many valuable properties.

*Hydrolysis of the calcium phosphates:* H. V. TARTER.

*On the hydrolysis of the silicates of sodium:* ROBERT HERMAN BOGUE.<sup>1</sup> A series of seven silicates of sodium have been examined in which the ratio of Na<sub>2</sub>O to SiO<sub>2</sub> in the molecule varied from 1:1 to 1:4. Solutions of each were made at five different molecular concentrations, and examined electrometrically for their hydroxyl-ion concentrations. From these values the degrees of hydrolytic dissociation have been calculated. Agreement with earlier investigations was not attained, and hypotheses are presented to account for this disparity. The values obtained for hydrolytic dissociation are much lower than have been previously reported. As the percentage of Na<sub>2</sub>O in the molecule increases, the resulting product becomes less stable, and in dilute solutions ever increasingly hydrolyzed.

*A revision of the atomic weight of antimony:* H. H. WILLARD and R. K. MCALPINE. Final report on the analysis of the tribromide.

*On the separation of crystalloids from one another by dialysis:* LOUIS KAHLENBERG. Using pyridine

<sup>1</sup>Industrial Fellow Mellon Institute of Industrial Research, Pittsburgh, Penna.

as the solvent and vulcanized rubber membranes as the septa, the members of the following pairs were separated from each other by dialysis: (1) cane sugar and sulphur; (2) silver nitrate and naphthalene; (3) silver nitrate and camphor; (4) silver nitrate and sulphur; (5) cane sugar and camphor; (6) cane sugar and naphthalene; (7) lithium chloride and sulphur; (8) lithium chloride and camphor; (9) lithium chloride and naphthalene. In the case of each pair, the last named substance passed through the membrane and the first named remained behind in the solution in the dialyser. The results are entirely in harmony with the author's views on osmosis as expressed in a previous paper, *Jour. Phys. Chem.*, 10, 141 (1906), and in fact the results obtained were predicted by the principles laid down in that paper. The work is being continued. Not only have crystalloids been separated from each other by dialysis, but colloids have also been thus separated from each other, and colloids have been separated from crystalloids by having the colloids pass through the membrane and crystalloids remain behind in the solution in the dialyser. These results too are in perfect accord with the principles of osmosis as expressed by the author in his previous publication (l. c.).

*Investigations on gelatines. Decay of viscosity on hydrolysis as a function of hydrogen ion concentration:* S. E. SHEPPARD, FELIX A. ELLIOTT, HARRY D. GIDEONSE and (MISS) C. M. GODDEN.

*Investigations on gelatines. Protein errors of indicators:* (MISS) A. J. BENEDICT and FELIX A. ELLIOTT.

*Gelatine as an emulsifying agent:* HARRY N. HOLMES and W. C. CHILDS. Using gelatine as a typical hydrated colloid excellent emulsions of kerosene-in-water were made and their stability observed. It was found that the leading factor as regards stability was a definite and most favorable viscosity, no matter how obtained. This viscosity could be secured by using the required concentration of gelatine, or with more gelatine made less viscous by such peptizing salts as sodium iodide, or with less gelatine made more viscous by coagulating salts of the sodium sulfate type. Lowering of surface tension was a factor of somewhat less importance. There was no evidence within the limits of accuracy employed of the formation of adsorption films at the oil-water interface. There must have been such adsorption but it was evidently too limited in amount to play a leading part in emulsification.

*Adsorption of precipitates III: The adsorption of precipitating ions by hydrous aluminum oxide:* HARRY B. WEISER and EDMUND B. MIDDLETON.

*The thermal decomposition of gaseous nitrogen pentoxide. A mono-molecular reaction:* FARRINGTON DANIELS and ELMER JOHNSTON. (Lantern.)

*The structure of gold amalgams:* S. A. BRALEY and R. F. SCHNEIDER. (Lantern.)

*Some new methods for determining the vapor pressure of hydrated salts:* ROBERT E. WILSON. (Lantern.)

*Measuring low vapor pressures:* ALAN W. C. MENZIES.

*Adsorption of gases by nickel catalyst and the mechanism of hydrogenation:* H. S. TAYLOR and A. W. GAUGER.

*A new form of titration hydrogen electrode:* FELIX A. ELLIOTT and S. F. ACREE.

*Electrometric standardizing of permanganate and dichromate with hydriodic acid, and the "super-oxidizing power" of dichromate:* W. S. HENDRIXSON. Potassium iodide, free from other halogens and standardized with silver, was titrated electrometrically in normal sulfuric acid with permanganate standardized with sodium oxalate. Known solutions of potassium dichromate were treated with twice their equivalent of potassium iodide, and the excess of the latter titrated with permanganate. The dichromates were true to theory, showing no "super-oxidizing power," contrary to J. Wagner and others and in agreement with G. Bruhns and others. The use of hydriodic acid as a standard in oxidimetry, practical applications and interferences will be further studied.

*The isotopes of lithium as related to the constitution of the nuclei of atoms:* W. D. HARKINS. (Lantern.)

*The distribution of strong electrolyte between benzene and water:* ARTHUR E. HILL.

*The cryoscopy of boron trifluoride solutions: system with hydrogen sulfide:* A. F. O. GERMANN and H. S. BOOTH.

*The dielectric constant of selenium oxychloride:* JAMES E. WILDISH.

*Ion conductance of strong electrolytes:* D. A. MCINNIS.

*The independent origin of acrinium:* ELLIOTT Q. ADAMS.

*Nephelometric estimation of sulfur and barium:* LLOYD K. RIGGS and C. WALTER EBERLEIN.

*Further studies on the freezing points of the nitrotoluenes:* J. M. BELL, E. B. CORDON, F. H. SPRY and W. WHITE.

*The system water-benzene-silver perchlorate:* ARTHUR E. HILL.

*The cryoscopy of boron trifluoride solutions: System with phosgene:* A. F. O. GERMANN and VERNON JERSEY. (Lantern.)

*III. The cryoscopy of boron trifluoride solutions: Systems with sulfur dioxide and with nitric oxide:* A. F. O. GERMANN and WENDELL PHILLIPS. (Lantern.)

*The cryoscopy of boron trifluoride solutions: System with hydrogen chloride:* A. F. O. GERMANN and LELAND R. SMITH. (Lantern.)

*Conductance corrections and ionic mobilities from hydrated ion concentration measurements:* FELIX A. ELLIOTT and S. F. ACREE.

*Contact potentials in hydrogen ion determinations:* (MISS) A. D. DUSHAK, FELIX A. ELLIOTT and S. F. ACREE.

*Titration curves of some new buffer mixtures:* (MISS) A. D. DUSHAK, FELIX A. ELLIOTT and S. F. ACREE.

*Investigations on gelatines. The Gold Number:* S. E. SHEPPARD and FELIX A. ELLIOTT.

*The hydrogenation of benzene:* H. S. TAYLOR and G. DOUGHERTY.

*Period of induction preceding changes of hydration in the hydrates of cupric sulfate:* NATHANIEL H. FURMAN and ALAN W. C. MENZIES.

*Certain physical properties of three oils:* ALAN W. C. MENZIES.

*The oxidation and luminescence of phosphorus I: The behavior of phosphorus in pure oxygen:* HARRY B. WEISER and ALLEN GARRISON.

*The photochemical decomposition of gaseous nitrogen pentoxide:* FARRINGTON DANIELS and ELMER JOHNSTON. (Lantern.)

*An improved method for the preparation of cuprous chloride and cuprous bromide:* HENRY C. WATERMAN and CURTIS M. PARKHURST. (By title.)

*"Radiation as factor in chemical action":* IRVING LANGMUIR.

*"The crystal structure of ice":* D. M. DENNISON and IRVING LANGMUIR.

#### DIVISION OF CHEMISTRY OF MEDICINAL PRODUCTS

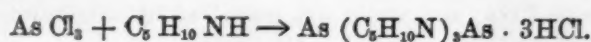
Charles E. Caspari, chairman

Edgar B. Carter, secretary

*A new organic arsenical and related compounds:* C. S. LEONARD<sup>1</sup> and EDWARD KREMERS. Preliminary experiments on the chemistry of the heptane solution having revealed the readiness with which the

<sup>1</sup> Newport Chemical Company Fellow.

halides of the elements of the fifth and fourth groups react with organic bases, the piperidine derivatives of arsenic, antimony, silicon, and tin were prepared. The reaction with arsenic trichloride may be indicated in the following manner:



A preliminary pharmacological investigation of the arsenic compound has been made by C. S. Leonard and Julia Whelan in the laboratory of Professor Loewenhardt. Compounds with other bases, also with other halides, have been prepared in the test tube, but have not yet been obtained in sufficient quantity and of desired purity for analysis and further study. The continuation of this line of research is contemplated. In another direction, a secondary hexyl derivative of piperidine has been prepared to test out a recent theory concerning the length of the chain in local anaesthetics. The preparation of the corresponding heptyl product is under way.

*Available chlorine for disinfectant bath:* L. E. SAYRE. Experiments with different formulæ solutions of hypochlorite, acting upon resistant microorganisms, to ascertain what kind of solution produces the maximum efficiency. Experiments performed to meet a demand of the Board of Health of Kansas.

*On the rate of evaporation of ethyl chloride from oils:* CHARLES BASKERVILLE and MYRON HIRSH.

*Experiences with and new applications of oil-ether in anesthesia:* CHARLES BASKERVILLE.

*Some recent anesthetics:* E. H. VOLWILER. Within the last year some local anesthetics have been produced to replace cocain for surface anesthesia. They are the gamma di-n-butylamino-propyl alcohol ester and the gamma diallylamino-propyl alcohol ester, respectively, of p-aminobenzoic acid. The latter is only two fifths as toxic as cocain and more than twice as effective on the rabbit's cornea. Two new local anesthetics of the anesthesin type are the n-butyl and the allyl esters of p-aminobenzoic acid. The former gives anesthesia of long duration, the latter very rapid anesthesia. This work has been done by the research staff of the Abbott Laboratories.

*The origin and biological significance of the diastases:* HUGH A. MCGUIGAN. A general study of diastatic activity has been undertaken in the attempt to determine the origin and significance of the diastases. From this work and previous work,

the following facts are obvious: All cell tissues contain diastase. The more vigorous and active the tissue the greater the diastase content. Diastase is formed in greater quantity, perhaps entirely, in the anabolic or growing state. This anabolic state persists to some extent as long as the tissue lives, and while not manifest by an increase in size, is manifest in the repair of tissues exhausted by the basal metabolism. In conditions of great waste, i.e., excessive katabolism, there is a decrease in diastase content. The method used for the determination of the diastatic content of the tissues is described in the *Journal of Biological Chemistry*, 1919, Vol. 39, p. 274. The order of diastatic activity of the dog and rabbit was given. The tissues of other animals show a close agreement with this test. The effect of the state of health on the diastatic content of the blood of human patients suffering from cancer, pernicious anemia and typhoid was compared with the diastatic content of normal blood. In all cases the content was lower in the diseased state. This is in agreement with what has been found on plants which contain more diastase in the healthy vigorous state. The suggestion is made tentatively that the diastase content of a tissue may be used as a measure of its functional activity, and perhaps also as a test of basal metabolism. While the work is unfinished it would seem that diastatic activity runs parallel with functional activity; the more active the tissue the greater its diastatic activity and the significance of the diastases is that of life itself. There is no indication that diastase is a waste product as has been assumed by some investigators.

*New benzyl esters possessing anti-spasmodic action:* H. A. SHONLE and P. Q. ROW. In investigating the anti-spasmodic action of the benzyl nucleus the benzyl esters of lauric, myristic, palmitic, stearic, and oleic acids were prepared. They are either liquid or low melting solids, insoluble in water and practically tasteless and odorless. They are hydrolyzed as readily as olive oil when acted on by lipase in vitro. They possess no irritating effect on the mucous membrane, and in clinical cases cause the relaxation of smooth muscle.

*Benzyl succinate:* MORTIMER BYE. Following in the footsteps of Macht, of Johns Hopkins, and appreciating the many objectionable features in the administration of benzyl benzoate, the writer was led to seek for some *solid* material which would be more suitable for medication and more palatable to

take. Benzyl succinate seemed to offer a solution of this problem, and accordingly the product was prepared, following modifications of the method of Bischoff & Von Hedenstrom (*Ber.*, 35, 4079) in which succinic acid and benzyl alcohol in molecular proportions are heated on an oil or metal bath for several hours at 180°–190°; after cooling and filtering the filtrate is subjected to vacuum distillation on a metal bath. The benzyl succinate distilling over at 235°–245° C. at 15 mm. pressure, crystallizes on cooling and is purified with solutions such as alcohol, ether or chloroform. The product is a beautiful snow white crystal, practically with very little odor or taste and practically non-toxic. Judging from our own experience and by the work of other investigators, benzyl succinate should be applicable to the treatment of all "diseases" wherein the use of benzyl benzoate is indicated. Such uses will be given in greater detail in the main paper.

*Benzyl derivatives of salicylic acid:* E. A. WILDMAN. It has seemed desirable to investigate the various types of compounds containing the benzyl radical in other types of linkage than esters. The benzyl ether of salicylic acid has been shown to possess distinct physiological activity.

*Some new compounds of phenyleinchoninic acid:* H. W. RHODEHAMEL and E. H. STUART. Phenyleinchoninic acid (2 phenyl-quinoline-4-carboxylic acid) combines readily with halogens and forms stable compounds with well characterized properties. A hydrochloride, hydroiodide, hydrobromide and hydrofluoride are described. Phenyleinchoninic acid also combines readily with quinine to form quinine phenyleinchoninate. This compound occurs as a white crystalline, nearly tasteless body, insoluble in water, but soluble in alcohol and acetone.

CHARLES L. PARSONS,  
Secretary

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## SCIENCE

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